

12-0-01 J005 Rec'd PCT/PTO 3 0 NOV 2001

FORM PTO-1390 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

47161-00031USPX

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO.  
(if known, see 37 CFR 1.5)

09/980430

INTERNATIONAL APPLICATION NO.  
PCT/NL00/00374

INTERNATIONAL FILING DATE  
May 31, 2000

PRIORITY DATE CLAIMED  
JUNE 1, 1999

TITLE OF INVENTION  
**COIL CONSTRUCTION FOR AN ELECTROACOUSTIC TRANSDUCER**

APPLICANT(S) FOR DO/EO/US

Aart Zeger Van Halteren; Engbert Wilmlink; Hendrik Dolleman; Paul Christiaan Van Hal

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☐ is attached hereto
  - b. ☒ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An **Unexecuted** oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 20 below concern document(s) or information included:**

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the International application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
  - Notification of Transmittal of the International Preliminary Examination Report (PCT Rule 71.1); and
  - PCT International Preliminary Examination Report

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/980430

INTERNATIONAL APPLICATION NO.

PCT/NL00/00374

ATTORNEY'S DOCKET NUMBER

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- 21.
- ☒
- The following fees are submitted:

**BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):**

Neither international preliminary examination fee (37 CFR 1.482)  
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO  
and International Search Report not prepared by the EPO or JPO ..... \$1,040.00

International preliminary examination fee (37CFR 1.482) not paid to  
USPTO but International Search Report prepared by the EPO or JPO ..... \$890.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO  
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$740.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO  
but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO  
And all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$100.00

**CALCULATIONS PTO USE ONLY****ENTER APPROPRIATE BASIC FEE AMOUNT =**

\$ 890.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492)(e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total Claims	19 - 20 =	0	x \$ 18.00
Independent Claims	5 - 3 =	2	x \$ 84.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00
<b>TOTAL OF ABOVE CALCULATIONS =</b>			

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- a.
- ☒
- A check in the amount of \$1,058.00 to cover the above fees is enclosed.

- b.
- ☒
- Please charge my Deposit Account No. 10-0447 (47161-00031USPX) in the amount of \$0.00 to cover the above fees.
- 
- (A duplicate copy of this sheet is enclosed.)
- DEFICIENCIES ONLY!**

- c.
- ☐
- The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. .... A duplicate copy of this sheet is enclosed.

- d.
- ☐
- Fees are to be charged to a credit card.
- WARNING:**
- Information on this form may become public.
- Credit card information should not be included on this form.**
- Provide credit card information and authorization on PTO-2038.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.127 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Daniel J. Burnham  
Reg. No. 39,618  
JENKENS & GILCHRIST  
225 West Washington Street, #2600  
Chicago, Illinois 60606  
(312) 425-3900 - telephone

SIGNATURE

Justin Swindells, Reg. No. 48,733  
JENKENS & GILCHRIST  
225 West Washington Street, #2600  
Chicago, Illinois 60606  
(312) 425-3900 - telephone

09/980430

JC10 Rec'd PGT/PTO 3 0 NOV 2001

## PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Aart Zeger van Halteren  
 Engbert Wilmink  
 Hendrik Dolleman  
 Paul Christiaan van Hal

Attorney Docket No. 47161-00031USPX

Group Art Unit: Unassigned

Serial No. Unassigned

Examiner: Unassigned

Filed: November 30, 2001

Title: Coil Construction for an  
 Electroacoustic Transducer

CERTIFICATE OF MAILING 37 C.F.R. 1.8

Express Mail Label No. EL722095137US

I hereby certify that this paper or fee is being deposited with the United States Postal Service EXPRESS MAIL POST OFFICE TO ADDRESSEE service under 37 C.F.R. 1.10 on the date indicated above and is addressed to: U.S. PATENT AND TRADEMARK OFFICE, P.O. Box 2327, Arlington, Virginia 22202, Attention: Box Patent Application.

11/30/2001

Adrienne White

U.S. PATENT AND TRADEMARK OFFICE  
 P.O. Box 2327  
 Arlington, Virginia 22202  
 Attention: Box Patent Application

PRELIMINARY AMENDMENT

Dear Sir:

This application is a U.S. national phase of International Application No. PCT/NL00/00374, filed May 31, 2000. Prior to examining the subject application, please enter the following amendments to the international application as originally filed.

IN THE SPECIFICATION:

Page 1 as originally filed, line 1, insert the following heading and paragraph before "The invention relates to . . .":

09/980430 "03980430"

--RELATED APPLICATIONS

This application is a U.S. national phase of International Application No. PCT/NL00/00374, filed May 31, 2000, which is a complete and foreign application of Dutch patent application No. 1012208, filed June 1, 1999.--

Page 1, line 13, delete "WO 91/10243" and insert therefor --U.S. Patent No. 5,610,989--.

Page 2, line 3, delete "WO 91/10243" and insert therefor --U.S. Patent No. 5,610,989--.

Page 2, line 28, delete "WO 91/10243" and insert therefor --U.S. Patent No. 5,610,989--.

Page 3, line 24, delete "Dutch patent application 1004877" and insert therefor --commonly assigned U.S. Patent No. 6,078,677, entitled "Electroacoustic Transducer With Improved Diaphragm Attachment," which is incorporated herein by reference in its entirety--.

**IN THE CLAIMS:**

Please cancel claims 1-7 as originally filed in the parent PCT application.

Please add new claims 8-26.

- 8. A coil assembly for an electroacoustic transducer, comprising:
- a coil having a coil opening defining an axis therethrough; and
  - a circuit board wherein at least a portion thereof is positioned against said coil in a substantially perpendicular relationship to said axis.

9. The coil assembly of claim 8, wherein said circuit board is flexible.
10. The coil assembly of claim 8, wherein said circuit board is rigid.
11. The coil assembly of claim 8, wherein said circuit board includes an opening, said opening of said circuit board being substantially aligned with said coil opening.
12. An assembly for an electroacoustic transducer, comprising:  
an armature having a first leg;  
a coil having a coil opening adapted to receive said first leg therethrough; and  
a circuit board having an opening adapted to receive said first leg therethrough,  
said circuit board being attached to said coil.
13. The assembly of claim 12, wherein said armature includes a second leg, said circuit board having a first slot adapted to receive said second leg therethrough.
14. The assembly of 12, wherein said first leg and said second leg are disposed to form a U-shaped armature.
15. The assembly of claim 13, wherein said armature includes a third leg, said circuit board having a second slot adapted to receive said third leg therethrough.

16. The assembly of claim 15, wherein said first leg, said second leg, and said third leg are disposed to form an E-shaped armature.

17. The assembly of claim 12, wherein said circuit board is attached to said coil via an adhesive.

18. The assembly of claim 12, wherein said coil opening and said circuit board opening are dimensioned so as to permit movement of said first leg of said armature in said coil opening and said opening.

19. The assembly of claim 12, wherein at least a portion of said circuit board is substantially perpendicular to said first leg.

20. An electroacoustic transducer, comprising:

a case;

a transducing assembly disposed in said case, including:

an armature having a first leg;

a coil having a coil opening through which said first leg is received;

a circuit board attached to said coil, said circuit board having an opening

through which said first leg is received, said circuit board

including at least one terminal; and

a magnet assembly including a first magnet separated from a second magnet by a gap, said first leg being received through said gap;  
and  
connecting means for connecting said first leg to a diaphragm disposed in said case.

21. The electroacoustic transducer of claim 20 further comprising a pin connected to said at least one terminal of said circuit board, said pin extending through an aperture in said case.

22. The electroacoustic transducer of claim 20, wherein said armature includes a second leg and a third leg, said circuit board includes a first slot disposed along a first outer edge of said circuit board and a second slot disposed along a second outer edge of said circuit board, said first slot receiving said second leg and said second slot receiving said third leg.

23. The electroacoustic transducer of claim 20, wherein said circuit board is substantially perpendicular to said first leg.

24. A method of assembling an electroacoustic transducer assembly, comprising the steps of:

providing a coil having a coil opening;

attaching a circuit board to said coil, said circuit board having an opening;

extending an armature leg through said coil opening and said opening; and  
positioning a magnet assembly adjacent to said circuit board such that said  
armature leg extends through a gap between a first magnet and a second magnet.

25. The method of claim 24, further comprising the step of dimensioning said coil  
opening, said opening, and said gap so as to permit movement of said armature leg  
therebetween.

26. A method of positioning a movable armature leg within a coil opening,  
comprising the steps of:

providing a coil having a coil opening therethrough;

attaching a circuit board to said coil, said circuit board having an opening  
therethrough and at least one slot formed along a peripheral edge of said circuit board;  
and

registering said movable armature leg in said coil opening by passing a support  
leg through said at least one slot.--

## REMARKS

The Applicants have added new claims 8-26. New claims 8-26 are generally  
directed to the subject matter of originally filed claims 1-7, which were indicated as  
allowable by the PCT Examiner, and are believed to be allowable. Attached hereto under  
the caption, "Clean Copy of Pending Claims after Entry of Preliminary Amendment



Mailed November 30, 2001," is a clean copy of the pending claims after entry of the present amendment.

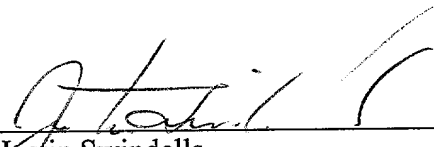
### **Conclusion**

The Applicants believe that the claims are allowable over the prior art of record and are in condition for allowance.

If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact the Applicants' undersigned attorney at the number indicated.

Respectfully submitted,

Date: November 30, 2001

  
Justin Swindells  
Reg. No. 48,733  
Jenkins & Gilchrist  
1445 Ross Avenue, Suite 3200  
Dallas, TX 75202-2799  
(312) 425-3900

Attorney for Applicants

**Pending Claims After Entry of  
Preliminary Amendment Mailed November 30, 2001**

8. A coil assembly for an electroacoustic transducer, comprising:  
a coil having a coil opening defining an axis therethrough; and  
a circuit board wherein at least a portion thereof is positioned against said coil in a substantially perpendicular relationship to said axis.
9. The coil assembly of claim 8, wherein said circuit board is flexible.
10. The coil assembly of claim 8, wherein said circuit board is rigid.
11. The coil assembly of claim 8, wherein said circuit board includes an opening, said opening of said circuit board being substantially aligned with said coil opening.
12. An assembly for an electroacoustic transducer, comprising:  
an armature having a first leg;  
a coil having a coil opening adapted to receive said first leg therethrough; and  
a circuit board having an opening adapted to receive said first leg therethrough,  
said circuit board being attached to said coil.
13. The assembly of claim 12, wherein said armature includes a second leg, said circuit board having a first slot adapted to receive said second leg therethrough.

14. The assembly of 12, wherein said first leg and said second leg are disposed to form a U-shaped armature.

15. The assembly of claim 13, wherein said armature includes a third leg, said circuit board having a second slot adapted to receive said third leg therethrough.

16. The assembly of claim 15, wherein said first leg, said second leg, and said third leg are disposed to form an E-shaped armature.

17. The assembly of claim 12, wherein said circuit board is attached to said coil via an adhesive.

18. The assembly of claim 12, wherein said coil opening and said circuit board opening are dimensioned so as to permit movement of said first leg of said armature in said coil opening and said opening.

19. The assembly of claim 12, wherein at least a portion of said circuit board is substantially perpendicular to said first leg.

20. An electroacoustic transducer, comprising:

a case;

a transducing assembly disposed in said case, including:

an armature having a first leg;

a coil having a coil opening through which said first leg is received;  
a circuit board attached to said coil, said circuit board having an opening  
through which said first leg is received, said circuit board  
including at least one terminal; and  
a magnet assembly including a first magnet separated from a second  
magnet by a gap, said first leg being received through said gap;  
and  
connecting means for connecting said first leg to a diaphragm disposed in  
said case.

21. The electroacoustic transducer of claim 20 further comprising a pin connected to  
said at least one terminal of said circuit board, said pin extending through an aperture in  
said case.

22. The electroacoustic transducer of claim 20, wherein said armature includes a  
second leg and a third leg, said circuit board includes a first slot disposed along a first  
outer edge of said circuit board and a second slot disposed along a second outer edge of  
said circuit board, said first slot receiving said second leg and said second slot receiving  
said third leg.

23. The electroacoustic transducer of claim 20, wherein said circuit board is  
substantially perpendicular to said first leg.

24. A method of assembling an electroacoustic transducer assembly, comprising the steps of:

providing a coil having a coil opening;

attaching a circuit board to said coil, said circuit board having an opening;

extending an armature leg through said coil opening and said opening; and

positioning a magnet assembly adjacent to said circuit board such that said armature leg extends through a gap between a first magnet and a second magnet.

25. The method of claim 24, further comprising the step of dimensioning said coil opening, said opening, and said gap so as to permit movement of said armature leg therebetween.

26. A method of positioning a movable armature leg within a coil opening, comprising the steps of:

providing a coil having a coil opening therethrough;

attaching a circuit board to said coil, said circuit board having an opening therethrough and at least one slot formed along a peripheral edge of said circuit board; and

registering said movable armature leg in said coil opening by passing a support leg through said at least one slot.

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Title: Coil construction for an electroacoustic transducer.

This invention relates to an electroacoustic transducer comprising a case accommodating an armature with at least two armature legs; a coil with an air gap, which coil is fitted with the air gap around an armature leg; a magnetic element with an air gap, which magnetic element is likewise  
5 fitted with the air gap around the one armature leg, the air gap of the coil and that of the magnetic element being located substantially in line with each other; a diaphragm; a connecting element which couples a free end of the one armature leg to the diaphragm; and a printed circuit board with terminals for the wires of the coil and for external connections, the coil  
10 being attached to the printed circuit board.

Such transducers find application especially, but not exclusively, in hearing aids.

Such a transducer is known, for instance, from WO 91/10243. This publication recognizes the problems in manipulating the lead wires of the  
15 coil. These wires are often microscopically thin and must be connected to more robust connecting wires connecting the coil to the further circuits in the hearing aid.

In this prior art reference, it is proposed as a solution to attach the coil, preferably automatically, directly upon winding, to terminal areas of a  
20 flexible printed circuit board, whereby first the lead wires of the coil are attached, for instance by welding or soldering, to the terminal areas of the printed circuit board and subsequently a side face of the coil is attached, for instance by adhesion, to the printed circuit board. The printed circuit board further has additional terminal areas to which the external connecting  
25 wires can be attached, for instance by soldering.

A flexible printed circuit board has the advantage that it can be laid in the case in any desired manner. It is often also possible, however, to use a printed circuit board from rigid material.

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A problem in existing coil constructions which are not already mounted on a printed circuit board, and in coil constructions which, as in the technique according to WO 91/10243, have already been pre-mounted on a, possibly flexible, printed circuit board, is that positioning the coil with respect to the other parts of the transducer, in particular with respect to the arm of the armature and with respect to the air gap of the magnetic element, is a painstaking, labor-intensive and time-consuming and hence costly activity.

The invention contemplates presenting a solution to this problem and to that end provides a transducer of the above-mentioned type, characterized in that the coil is attached to the printed circuit board by an end face thereof, which is located essentially perpendicularly to the longitudinal axis of the air gap, and that the printed circuit board is provided with an opening which corresponds with the air gap of the coil. Preferably, the printed circuit board is provided with at least one recess adapted to cooperate with at least one other leg of the armature.

The invention further provides a coil construction for an electromagnetic transducer, comprising a coil with an air gap and a printed circuit board with terminals for wires of the coil and external connections, characterized in that the coil is attached to the printed circuit board by an end face thereof, which is located essentially perpendicularly to the longitudinal axis of the air gap, and that the printed circuit board is provided with an opening which corresponds with the air gap of the coil.

The invention is based on the insight that the printed circuit board can be fixedly connected to the armature and that, as a result, a coil fixedly connected to the printed circuit board can be accurately positioned with respect to the armature. By means of an automatic manufacturing process, for instance as elucidated in WO 91/10243, it is possible to position the coil very accurately with respect to the printed circuit board and to attach it thereto, for instance by means of adhesive. When thereupon the printed

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circuit board can be positioned with respect to the armature very accurately, the position of the coil with respect to the armature is thereby determined very accurately as well. The operation required for this purpose consists in sliding the printed circuit board over the armature, which is an operation  
5 which can be performed simply and fast. The invention thus provides an excellent solution to the above-outlined problem.

Hereinbelow, the invention will be further explained on the basis of an exemplary embodiment, with reference to the drawings. In the drawings:

10 Fig. 1 is a cross section of an electromagnetic transducer known per se;

Fig. 2a is a perspective view of a coil mounted on a printed circuit board, for an electromagnetic transducer according to the invention;

Fig. 3a is an exploded view of a magnetic body, a coil construction  
15 according to the invention, and an armature; and

Fig. 3b shows the parts shown in Fig. 3a in assembled condition.

In elucidation of the use of the coil construction according to the invention in an electroacoustic transducer, Fig. 1 schematically shows a transducer known per se for use in a hearing aid.

20 The transducer comprises a case 1 with an upper case portion 1a and a lower case portion 1b. The interior of the case communicates with the surroundings via a snout 3. In the case, a diaphragm 4 is fitted in such a manner that it can move freely relative to the case, for instance in the manner described in Dutch patent application 1004877. The diaphragm  
25 communicates via a so-called reed 5 with the end of a central armature leg 6a of an armature 6. In this case, the armature is E-shaped, as appears more clearly from Fig. 3, but may also be U-shaped.

Provided around the armature leg are a magnet 7, which is accommodated in a pole piece 8, and a coil 9. Both the magnet and the coil  
30 have a central opening disposed around the armature leg 6a, such that the



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armature leg can move freely in these openings. Between the coil and the magnet/pole piece combination, an adhesive film 2 is provided to fix these parts with respect to each other. The coil lead wires, not shown, are passed through the case to a printed circuit board 10 with terminals 11 to which  
5 the coil lead wires and the external connecting wires can be attached, for instance by soldering.

Electrical signals fed via the lead wires of the coil provide for a movement of the armature leg 6a, which movement is transmitted via the reed to the diaphragm 4, which converts the movement into the sound  
10 signals to be perceived via the snout 3.

It will be clear that it is a painstaking and labor-intensive activity to position the coil in the transducer shown in Fig. 1 and to connect the coil wires to the print 10.

Fig. 2 schematically shows a view of the coil construction according to the invention. The core-free coil 9 may be provided, on the circumference thereof, with terminals 12 for the coil lead wires 13a, from which terminals 12 further wires 13b lead to the printed circuit board 14. It is equally possible, however, to connect the coil lead wires 13a directly to the terminal areas 15 on the printed circuit board 14, which may be flexible or rigid, as  
15 desired. The coil body 9 is attached, for instance by adhesion, to the printed circuit board through a coil end face, which is located essentially perpendicularly to the longitudinal axis of the central opening in the coil. This can be done with great accuracy in an automatic manner.  
20

The printed circuit board further comprises terminal areas, not shown, for attaching connections to the exterior of the transducer. These  
25 further terminal areas are connected through print tracks to the terminal areas 15, or are part thereof.

An elegant solution for providing a connection between the printed circuit board 14 and the exterior of the transducer is to provide pins which  
30 at one end are connected, for instance by soldering, to the terminal areas on

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the printed circuit board 14 and which project outside through openings in the case wall to be connected to a printed circuit board present there, having further electronics for signal processing. Such pins can be rigid or slightly flexible and are to be passed, insulated, through the openings  
5 provided in the case wall for that purpose. In Fig. 3a two of such pins 18 are schematically shown.

As clearly shown in Figs. 3a and b, the printed circuit board 14 is provided with an opening 16 and recesses 17a, b, while the opening 16 corresponds with the air gap of the coil and can be slid over the armature  
10 leg 6a. The opening 16 is so dimensioned that the free movement of the armature leg is not hampered. The recesses 17a and b are slid over the two other legs 6b and 6c of the E-shaped armature 6. Naturally, the recesses 17a, b, instead of being slotted, can also be closed all round or have any other shape that is suitable to be slid over the armature legs 6b, c.

15 The recesses 17a and b fit accurately over the armature legs 6b and 6c, so that the position of the printed circuit board 14 with respect to the armature is very accurate. Because positioning the coil 9 with respect to the printed circuit board can also be done very accurately, the problem of positioning the coil body with respect to the central armature leg has been  
20 resolved in a simple manner.

It will be clear that the principle according to the invention is also applicable in U-shaped armatures, that is, an armature where either of the legs 6b or 6c is absent.

It will also be clear that there are other possibilities of accurately  
25 positioning the printed circuit board with respect to the armature than by way of recesses 17a and b.

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## CLAIMS

1. An electroacoustic transducer comprising a case accommodating an armature with at least two armature legs; a coil with an air gap, which coil is fitted with the air gap around one armature leg; a magnetic element with an air gap, which magnetic element is likewise fitted with the air gap
- 5 around the one armature leg, the air gap of the coil and that of the magnetic element being located in line with each other; a diaphragm; a connecting element which couples a free end of the one armature leg to the diaphragm; and a printed circuit board with terminals for the wires of the coil and for external connections, the coil being attached to the printed circuit board,
- 10 characterized in that the coil is attached to the printed circuit board by an end face thereof, which is located essentially perpendicularly to the longitudinal axis of the air gap, and that the printed circuit board is provided with an opening which corresponds with the air gap of the coil.
- 15 2. An electroacoustic transducer according to claim 1, characterized in that the printed circuit board is further provided with at least one recess adapted to cooperate with at least one other leg of the armature.
3. An electroacoustic transducer according to claim 2, characterized in
- 20 that the armature is E-shaped, and that the printed circuit board is provided with two recesses, respectively cooperating with an outer leg of the armature.
4. An electroacoustic transducer according to any one of claims 1-3,
- 25 characterized in that the coil is glued to the printed circuit board.
5. An electroacoustic transducer according to any one of claims 1-4, characterized in that for the purpose of external connections, pins are

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connected to the terminal areas on the printed circuit board, which pins project through the wall of the case.

6. A coil construction for an electromagnetic transducer, comprising a  
5 coil with an air gap and a printed circuit board with terminals for wires of the coil and external connections, characterized in that the coil is attached to the printed circuit board by an end face thereof which is located essentially perpendicularly to the longitudinal axis of the air gap and that the printed circuit board is provided with an opening which corresponds  
10 with the air gap.

7. A coil construction according to claim 6, characterized in that the printed circuit board is provided with at least one recess along the circumferential edge thereof.

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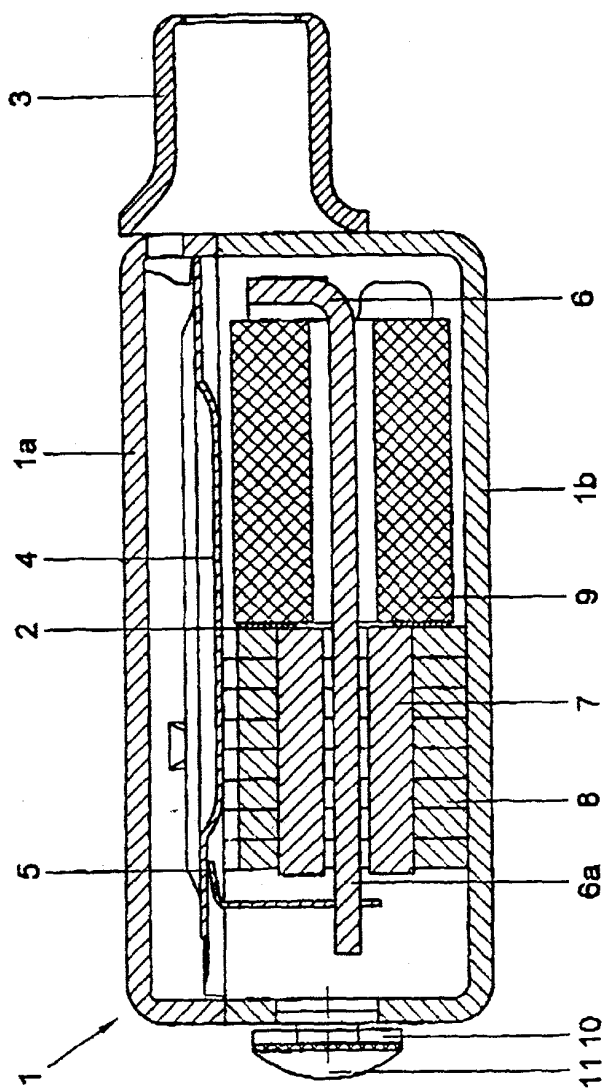
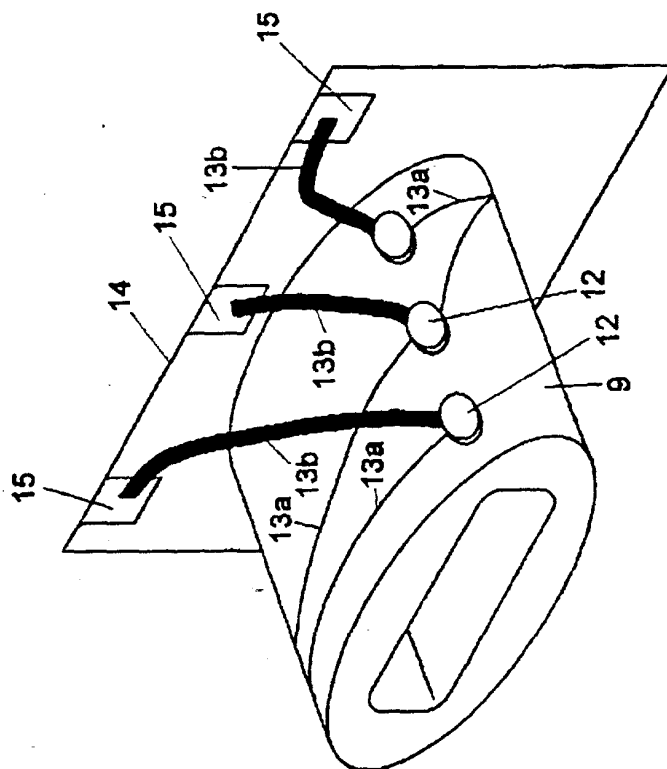


Fig. 1

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**Fig. 2**

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2
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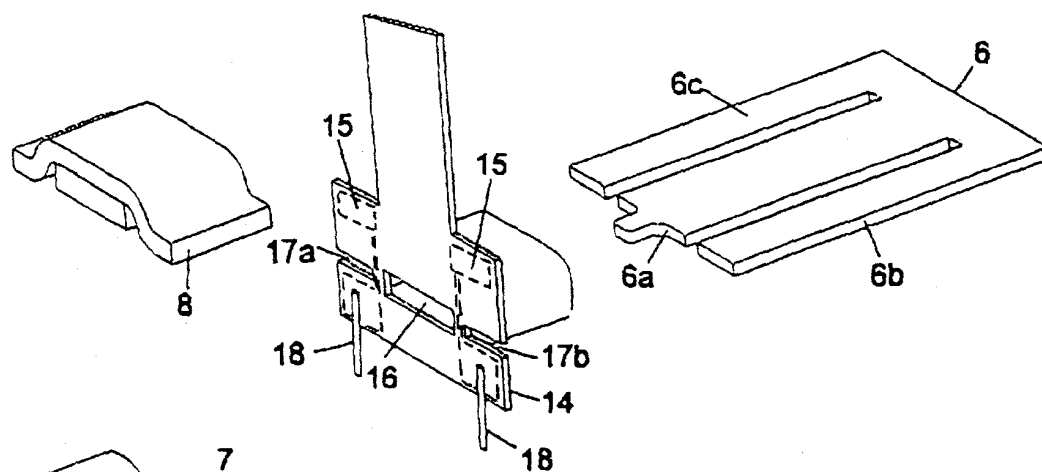


Fig. 3a

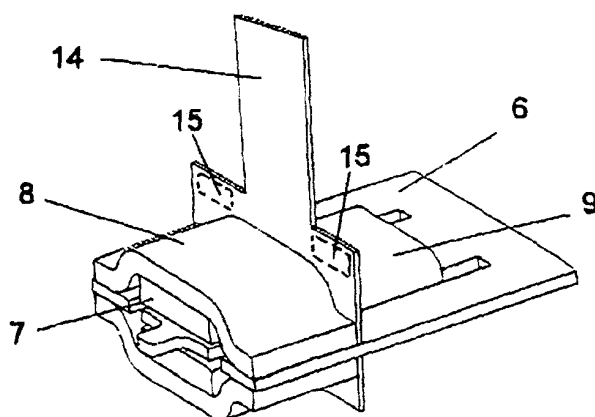


Fig. 3b



PATENT APPLICATION  
ATTNY. DOCKET NO.: 47161-00031USPX

**RULES 63 AND 67 (37 C.F.R. 1.63 and 1.67)  
DECLARATION AND POWER OF ATTORNEY**

FOR UTILITY/DESIGN/CIP/PCT NATIONAL APPLICATIONS

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; and

I believe that I am **the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below)** of the subject matter which is claimed and for which a patent is sought on the invention entitled: **COIL CONSTRUCTION FOR AN ELECTROACOUSTIC TRANSDUCER**, the specification of which: **(mark only one)**

- X   (a) is attached hereto.  
  X   (b) was filed on November 30, 2001, as Application Serial No. 09/980,430 and was amended on \_\_\_\_\_ (if applicable)  
 \_\_\_\_\_ (c) was filed as PCT International Application No. \_\_\_\_\_ on \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).  
 \_\_\_\_\_ (d) was filed on \_\_\_\_\_ as Application Serial No. \_\_\_\_\_ and was issued a Notice of Allowance on \_\_\_\_\_.  
 \_\_\_\_\_ (e) was filed on \_\_\_\_\_ and bearing attorney docket number \_\_\_\_\_

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above or as allowed as indicated above.

I acknowledge the duty to disclose all information known to me to be material to the patentability of this application as defined in 37 CFR § 1.56. If this is a continuation-in-part (CIP) application, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability of the application as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

I hereby claim foreign priority benefits under 35 U.S.C. § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which my priority is claimed or, (2) if no priority is claimed, before the filing date of this application:

PRIOR FOREIGN PATENTS

Number	Country	Month/Day/ Year Filed	Date first laid- open or Published	Date patented or Granted	Priority Claimed	
					Yes	No
1012208	Netherlands	06/01/99	12/07/00	N/A	X	

I hereby claim the benefit under 35 U.S.C. § 120/365 of any United States application(s) listed below and PCT international applications listed above or below:



PRIOR U.S. OR PCT APPLICATIONS

PCT/NL00/00374

May 31, 2000

Published 12/07/00

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(Application Serial No.)

(Filing Date)

(Status)

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all of the firm of **JENKENS & GILCHRIST, a Professional Corporation**, 1445 Ross Avenue, Suite 3200, Dallas, Texas 75202-2799, as my attorneys and/or agents, with full power of substitution and revocation, to prosecute this application, provisionals thereof, continuations, continuations-in-part, divisionals, appeals, reissues, substitutions, and extensions thereof and to transact all business in the United States Patent and Trademark Office connected therewith, to appoint any individuals under an associate power of attorney and to file and prosecute any international patent application filed thereon before any international authorities, and I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization who/which first sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct them in writing to the contrary.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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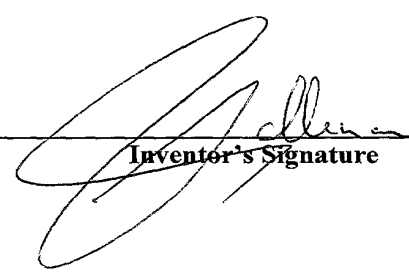
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